

CLAIMS

1. A composition comprising an abrasive having a surface on which at least one stabilizer and at least one catalyst are bonded, provided that the at least one stabilizer differs from the at least one catalyst.

5 2. The composition of claim 1, further comprising:
an oxidizing agent; and
a medium in which the abrasive and the oxidizing agent are contained, wherein the at least one catalyst is adapted to catalyze an oxidation reaction of the oxidizing agent with a substrate.

10 3. The composition of claim 2, wherein the oxidizing agent is hydrogen peroxide and the medium is deionized water.

4. The composition of claim 3, wherein the abrasive is a member selected from the group consisting of alumina, titania, zirconia, germania, silica, ceria and mixtures thereof, the at least one stabilizer comprises at least one member selected from
15 the group consisting of B, W and Al, and the at least one catalyst comprises at least one member selected from the group consisting of Cu, Fe, Mo, Mn, Ti, W and V.

5. A composition comprising an abrasive having a surface on which at least one stabilizer and at least one catalyst are bonded, wherein the abrasive is a member selected from the group consisting of alumina, titania, zirconia, germania, silica, ceria
20 and mixtures thereof, the at least one stabilizer comprises at least one member selected from the group consisting of B, W and Al, and the at least one catalyst comprises at least one member selected from the group consisting of Cu, Fe, Mn, Ti, W and V, provided that the at least one stabilizer and the at least one catalyst are not simultaneously W.

6. The composition of claim 5, wherein the abrasive is colloidal silica.

25 7. The composition of claim 5, wherein the stabilizer is Boron

8. The composition of claim 5, wherein the catalyst is Fe, Cu or W.

9. The composition of claim 5, wherein the abrasive is silica, the at least one stabilizer is B and the at least one catalyst is Fe.

10. The composition of claim 5, wherein the abrasive is silica; the at least one
30 stabilizer is B and the at least one catalyst is Cu.

11. The composition of claim 5, wherein the abrasive is silica, the at least one stabilizer is W and the at least one catalyst is Fe.

12. A composition comprising:

an abrasive having a surface on which at least one stabilizer and at least one catalyst are bonded provided that the at least one stabilizer differs from the at least one catalyst;

an oxidizing agent; and

5 a medium in which the abrasive and the oxidizing agent are contained,
wherein the at least one catalyst is adapted to catalyze an oxidation reaction of the oxidizing agent with a substrate.

13. The composition of claim 12, wherein the abrasive is a member selected from the group consisting of alumina, titania, zirconia, germania, silica, ceria and
10 mixtures thereof, the at least one stabilizer comprises at least one member selected from the group consisting of B, W and Al, the at least one catalyst comprises at least one member selected from the group consisting of Cu, Fe, Mn, Ti, W and V, and the oxidizing agent is at least one member selected from the group consisting of periodic acid, hydrogen peroxide and urea-hydrogen peroxide.

14. The composition of claim 12, wherein the abrasive is silica, at least one
15 stabilizer is Boron, and at least one catalyst is Fe and the oxidizing agent is hydrogen peroxide.

15. The composition of claim 12, wherein the abrasive is silica, the at least
one stabilizer is Boron, and at least one catalyst is Cu and the oxidizing agent is
20 hydrogen peroxide.

16. The composition of claim 12, wherein the abrasive is silica, the at least
one stabilizer is W, the at least one catalyst is Fe and the oxidizing agent is hydrogen peroxide.

17. A method for polishing a surface of a substrate, said method comprising
25 applying the composition of claim 1 to the surface of the substrate to polish the surface of the substrate, wherein the substrate comprises at least one member selected from the group consisting of W, Ti, TiN, Cu, Ta, TaN and SiO₂.

18. The method of claim 17, wherein the substrate further comprises a material having a dielectric constant less than 2.8.

19. The method of claim 17, wherein the composition further comprises:
30 an oxidizing agent; and
a medium in which the abrasive and the oxidizing agent are contained, wherein the at least one catalyst is adapted to catalyze an oxidation reaction of the oxidizing agent with a substrate.

20. The method of claim 19, wherein the abrasive is a member selected from the group consisting of alumina, titania, zirconia, germania, silica, ceria and mixtures thereof, the at least one stabilizer comprises at least one member selected from the group consisting of B, W and Al, the at least one catalyst comprises at least one member
5 selected from the group consisting of Cu, Fe, Mn, Ti, W and V, and the substrate comprises at least one member selected from the group consisting of W, Ti, TiN, Cu, Ta, TaN and SiO₂.

21. The method of claim 20, further comprising:
applying the composition to a polishing pad; and
10 applying the polishing pad to the surface of the substrate to planarize the substrate.

22. The method of claim 21, wherein the substrate comprises W and a dielectric material, and a selectivity for removal of W relative to removal of the dielectric material from said substrate is at least 10:1.

23. The method of claim 21, wherein the abrasive is silica, the at least one stabilizer is B, the at least one catalyst is Fe and the oxidizing agent is hydrogen
15 peroxide.

24. The method of claim 21, wherein the abrasive is silica, the at least one stabilizer is B, the at least one catalyst is Cu and the oxidizing agent is hydrogen
20 peroxide.

25. The method of claim 21, wherein the abrasive is silica, the at least one stabilizer is W, the at least one catalyst is Fe and the oxidizing agent is hydrogen
peroxide.

26. The method of claim 21, wherein the composition is substantially free of
25 soluble metal catalysts.

27. The composition of claim 2, wherein the composition is substantially free
of soluble metal catalysts.

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